

PREPARED PURSUANT TO SECTION 303(D) AND SECTION 305(B) OF THE CLEAN WATER ACT

BY

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

EXHIBIT

119

Connolly037612

THIS PAGE INTENTIONALLY LEFT BLANK

---

## Table of Contents

|   |    |
|---|----|
| Acronyms and Definitions .....  | 1  |
| Agencies.....   | 1  |
| Terminologies .....   | 1  |
| Executive Summary/Overview.....   | 5  |
| Clean Water Act (CWA) Section 303(d) Requirements .....                       | 5  |
| CWA Section 305(b) Requirements.....  | 5  |
| Integrated List Guidance .....  | 5  |
| Category 1 .....  | 6  |
| Category 2 .....  | 6  |
| Category 3 .....  | 6  |
| Category 4 .....  | 7  |
| Category 5 .....  | 7  |
| Synopsis .....  | 8  |
| Surface Water Quality.....  | 13 |
| Ground Water Quality.....   | 14 |
| Background .....  | 15 |
| Diversity and Ecology.....  | 15 |
| Climate.....  | 19 |
| Water Pollution Control Programs.....   | 19 |
| Water Quality Standards Program .....   | 20 |
| Point Source Control Program .....  | 22 |
| Nonpoint Source Control Program.....  | 24 |
| Superfund Program .....   | 26 |
| Cost/Benefit Assessment .....   | 31 |
| Costs .....   | 31 |
| Benefits .....  | 33 |
| Surface Water Assessment .....  | 35 |
| Surface Water Monitoring Program .....  | 35 |
| Brief Summary of Oklahoma Conservation Commission Monitoring Activities ..... | 35 |
| Brief Summary of Oklahoma Water Resources Board Monitoring Activities .....   | 36 |
| Brief Summary of Oklahoma Corporation Commission Monitoring Activities.....   | 36 |
| Assessment Methodology.....   | 38 |
| Use Support Assessment Protocol .....   | 38 |
| Beneficial Uses.....  | 38 |
| Data Requirements .....   | 38 |
| Quality Assurance.....  | 40 |
| Default Protocol .....  | 40 |
| Fish & Wildlife Propagation (F&WP) .....                                      | 41 |
| Dissolved Oxygen (DO) .....   | 41 |
| Toxicants .....   | 42 |
| pH.....   | 43 |
| Biological Data .....   | 43 |
| Turbidity .....   | 44 |
| Oil & Grease .....  | 45 |
| Sediment .....  | 45 |
| Toxicants Not Assessed and Not Likely to Occur or Violate Criteria.....       | 46 |
| Primary Body Contact Recreation (PBCR) .....                                  | 46 |
| Fecal Coliform .....  | 46 |
| Escherichia coli (E. coli).....   | 47 |
| Enterococci .....   | 47 |
| Secondary Body Contact.....   | 48 |

---



---

|  |    |
|--|----|
| <i>Public and Private Water Supply (PPWS)</i> .....                            | 48 |
| Toxicants .....  | 48 |
| Total Coliform .....   | 48 |
| Oil & Grease .....   | 49 |
| Parameters Not Assessed and Not Likely to Occur or Violate Criteria .....      | 49 |
| Chlorophyll-a and Phosphorus .....   | 49 |
| <i>Emergency Water Supply (EWS)</i> .....                                      | 50 |
| <i>Agriculture</i> .....   | 50 |
| Total dissolved solids (TDS).....  | 50 |
| Chlorides .....  | 50 |
| Sulfates.....  | 51 |
| <i>Navigation</i> .....  | 51 |
| <i>Aesthetics</i> .....  | 52 |
| Nutrients .....  | 52 |
| Phosphorus .....   | 52 |
| Oil & Grease .....   | 52 |
| <i>Fish Consumption</i> .....  | 52 |
| <i>Category Decision Methodology</i> .....                                     | 53 |
| <i>Causes of Non-Attainment</i> .....  | 55 |
| <i>Sources of Non-Attainment</i> .....   | 55 |
| <i>Prioritization of TMDL Development &amp; Future Monitoring</i> .....        | 61 |
| <i>Coordination, Review, And Approval</i> .....                                | 63 |
| <i>Groundwater Quality</i> .....   | 65 |
| Overview .....   | 65 |
| Major Aquifers with Anthropogenic Water Quality Problems or Concerns .....     | 66 |
| Non-major Aquifers with Anthropogenic Water Quality Problems or Concerns ..... | 69 |
| Major Sources of Contamination .....   | 69 |
| Overview of State Groundwater Protection Programs .....                        | 71 |
| Oklahoma's Wellhead Protection Program .....                                   | 73 |
| Groundwater Indicators.....  | 73 |
| References.....  | 75 |

## **List of Figures**

|   |    |
|---|----|
| Figure 1. Ecoregions of Oklahoma.....                             | 16 |
| Figure 2. Oklahoma Geology.....                                   | 17 |
| Figure 3. Oklahoma Counties.....                                  | 18 |
| Figure 4. Ecoregions Where Biocriteria Have Been Established..... | 44 |
| Figure 5. Integrated Report Category Decision Tree .....          | 54 |
| Figure 6. Rotating Basin Plan Watersheds by Year .....            | 63 |
| Figure 7. Mailout Request for Public Input .....                  | 64 |
| Figure 8. Groundwater Aquifers of Oklahoma.....                   | 67 |

## **List of Tables**

|   |    |
|---|----|
| Table 1. Lake Category Summary.....                                 | 8  |
| Table 2. River and Stream Category Summary.....                     | 9  |
| Table 3. Lake Beneficial Use Support Summary .....                  | 9  |
| Table 4. River and Stream Beneficial Use Support Summary.....       | 10 |
| Table 5. Lake Acres Impaired by Specific Pollutant .....            | 10 |
| Table 6. River and Stream Miles Impaired by Specific Pollutant..... | 11 |
| Table 7. Lake Acres Impaired by Potential Source.....               | 12 |
| Table 8. River and Stream Miles Impaired by Potential Source .....  | 12 |

---

|  |    |
|--|----|
| Table 9. Atlas of Oklahoma.....  | 19 |
| Table 10. Superfund, NPL, and Non-NPL Sites Impacting on Groundwater and Surface Water.....  | 26 |
| Table 11. Federal Clean Water Act and State Matched Funding for Currently Active Grants.....   | 31 |
| Table 12. FY 2006-2007 Municipal Wastewater Treatment Construction Projects funded through the Clean Water State Revolving Fund..... | 32 |
| Table 13. Temperature- and pH-Dependent Screening Values for Ammonia .....   | 42 |
| Table 14. Decision Matrix for Toxicants Not Assessed or Likely to Occur or Violate F&WP Criteria .....                               | 46 |
| Table 15. Cause Codes.....   | 55 |
| Table 16. Source Codes.....  | 56 |
| Table 17. Useful Information in Determining Sources of Beneficial Use Non-Attainment .....   | 57 |
| Table 18. TMDL Prioritization-Point Ranking .....  | 62 |
| Table 19. Major Sources of Contamination .....   | 70 |
| Table 20. Summary of the State Groundwater Protection Programs .....   | 71 |
| Table 21. Public water supply standards violations .....   | 73 |

## **List of Appendices**

|   |     |
|---|-----|
| Appendix A – Oklahoma's Waterbody Identification System ..... | A-1 |
| Appendix B – Comprehensive Waterbody Assessment .....         | B-1 |
| Appendix C – 303(d) List of Impaired Waters.....              | C-1 |
| Appendix D – 303(d) Delisting Justifications.....             | D-1 |
| Appendix E – Response to Comments .....                       | E-1 |

THIS PAGE INTENTIONALLY LEFT BLANK

## Acronyms and Definitions

### Agencies

|                               |  |
|-------------------------------|--|
| <b>ODAFF</b>                  | Oklahoma Department of Agriculture Food and Forestry |
| <b>OCC</b>                    | Oklahoma Conservation Commission                     |
| <b>Corporation Commission</b> | Oklahoma Corporation Commission                      |
| <b>OSDH</b>                   | Oklahoma State Department of Health                  |
| <b>OSE</b>                    | Office of the Secretary of Environment               |
| <b>DEQ</b>                    | Oklahoma Department of Environmental Quality         |
| <b>OWRB</b>                   | Oklahoma Water Resources Board                       |
| <b>Wildlife Department</b>    | Oklahoma Department of Wildlife Conservation         |

### Terminologies

|               |   |
|---------------|---|
| <b>303(d)</b> | This section of the Clean Water Act requires each state to identify waters that do not or are not expected to meet applicable Water Quality Standards with technology-based controls alone. States are required to establish a priority ranking for the waters, taking into account the pollution severity and designated uses of the waters. Once identification and priority ranking are completed, states are to develop Total Maximum Daily Loads at a level necessary to achieve the applicable state Water Quality Standards. |
| <b>304(l)</b> | This section of the Clean Water Act requires each state to identify those waters that fail to meet Water Quality Standards due to toxic pollutants and other sources of toxicity. It also requires the preparation of individual control strategies that will reduce point source discharges of toxic pollutants.   |
| <b>305(b)</b> | This section of the Clean Water Act requires each state to report its water quality on a biennial cycle.  |
| <b>314</b>    | This section of the Clean Water Act requires each state to establish a Lake Water Quality Assessment Report. This section provides federal funds for the state to submit a classification of lakes according to trophic condition, develop processes and methods to control sources of pollution and to work with other agencies in restoring the quality of those lakes. Section 314 establishes the guidelines for conducting Clean Lake Studies Phase I and II.  |
| <b>319(h)</b> | This section of the Clean Water Act requires each state to develop a State Assessment Report and a Management Program for Nonpoint Source pollution problems. The Assessment Report is to describe the nature, extent, and effects of Nonpoint Source pollution, the causes and sources of such pollution, and programs and methods used for controlling this pollution.  |

|                         |  |
|-------------------------|--|
| <b>BMPs</b>             | Best Management Practices: A technique that is determined to be the most effective, practical means of preventing or reducing pollutants from nonpoint sources in order to achieve water quality goals.  |
| <b>BOD<sub>5</sub></b>  | Biochemical Oxygen Demand (5-Day): The oxygen used in meeting the metabolic needs of aerobic microorganisms in water rich in organic matter -- called also biological oxygen demand; the test requires five days of laboratory time and results may vary when toxic substances are present which effect bacteria.  |
| <b>CBOD<sub>5</sub></b> | Carbonaceous Biochemical Oxygen Demand (5-Day): That portion of the BOD that is not due to oxidation of nitrogenous compounds.   |
| <b>CTSI</b>             | Carlson's Trophic State Index ( $CTSI = 9.81 \ln[chl-\alpha] + 30.6$ ).  |
| <b>CWA</b>              | Clean Water Act: Public Law 92-500 enacted in 1972 provides for a comprehensive program of water pollution control; two goals are proclaimed in this Act: (1) to achieve swimmable, fishable waters wherever attainable by July 1, 1983, and (2) by 1985 eliminate the discharge of pollutants into navigable waters.  |
| <b>DDT</b>              | Dichlorodiphenyltrichloroethane: A colorless odorless water-insoluble crystalline insecticide $C_{14}H_9Cl_5$ that tends to accumulate in ecosystems and has toxic effects on many vertebrates.  |
| <b>DO</b>               | Dissolved Oxygen: The amount of oxygen dissolved in water. DO concentrations range from a few parts per million up to about 10 ppm for most Oklahoma streams. A level of DO around 7 ppm is essential to sustain desired species of game fish. If DO drops below 5 ppm the danger of a fish kill is present and malodorous conditions will result. The major factors determining DO levels in water are temperature, atmospheric pressure, plant photosynthesis, rate of aeration and the presence of oxygen demanding substances such as organic wastes. In addition to its affect on aquatic life, DO also prevents the chemical reduction and subsequent movement of iron and manganese from the sediments and thereby reduces the cost of water treatment. |
| <b>µg/L</b>             | Microgram/liter.   |
| <b>NPDES</b>            | National Pollutant Discharge Elimination System: A permit program established by Section 402 of the Clean Water Act. This program regulates discharges into the nation's water from point sources, including municipal, industrial, commercial and certain agricultural sources.   |
| <b>NTU</b>              | Nephelometric Turbidity Units: The measurement of the extent or degree of cloudiness by means of a nephelometer (an instrument for determining the concentration or particle size of suspensions by means of transmitted or reflected light).  |
| <b>OKWBID</b>           | Oklahoma Waterbody Identification number: A unique identifier assigned to each waterbody in Oklahoma. For a complete description of OKWBIDs, please see Appendix A.  |
| <b>PCB(s)</b>           | Polychlorinated Biphenyl(s): Any of several compounds that are produced by replacing hydrogen atoms in biphenyl with chlorine, have various industrial applications, and are poisonous environmental pollutants which tend to accumulate in animal tissues.  |
| <b>pH</b>               | The negative logarithm of the effective hydrogen ion concentration or hydrogen-ion activity in gram equivalents per liter used in expressing both acidity and alkalinity on  |



|                                       |   |
|---------------------------------------|---|
|                                       | a scale whose values run from 0 to 14 with 7 representing neutrality, numbers less than 7 increasing acidity, and numbers greater than 7 increasing alkalinity.   |
| <b>Playa Lakes / Prairie Potholes</b> | Shallow, small, ephemeral to permanent closed basin lake, typically found in high plains and deserts.   |
| <b>TDS</b>                            | Total Dissolved Solids: The complete amount of solid matter dissolved in water or wastewater.   |
| <b>TMDL</b>                           | Total Maximum Daily Load: The sum of individual wasteload allocations for point sources, safety, reserves, and loads from nonpoint source and natural backgrounds.  |
| <b>WLA</b>                            | Wasteload Allocation: The assignment of target loads to point sources so as to achieve Water Quality Standards in the most efficient manner. The wasteload allocation is designed to allocate or allow certain quantities, rates or concentration of pollutants discharged from contributing point sources which empty their effluent into the same river segment. The purpose of the wasteload allocation is to eliminate an undue "wasteload burden" on a given stream segment. |
| <b>WQS</b>                            | Water Quality Standards: rules which establish classifications of uses of waters of the state, criteria to maintain and protect such classifications, and other standards or policies pertaining to the quality of such waters.<br>The purpose of the Standards is to promote and protect as many beneficial uses as are attainable and to assure that degradation of existing quality of waters of the State does not occur. These rules can be found at OAC 785:45.             |

THIS PAGE INTENTIONALLY LEFT BLANK

## **Executive Summary/Overview**

### **Clean Water Act (CWA) Section 303(d) Requirements**

The 1972 amendments to the Clean Water Act include Section 303(d). The regulations implementing Section 303(d) require states to develop lists of water bodies that do not meet water quality standards and to submit updated lists to the U. S. Environmental Protection Agency (EPA) every two years. Water quality standards, as defined in the Code of Federal Regulations, include beneficial uses, water quality objectives (narrative and numerical) and anti-degradation requirements. The EPA is required to review impaired water body lists submitted by each state and approve or disapprove all or part of the list.

For waterbodies on the 303(d) list, the Clean Water Act requires that a pollutant load reduction plan or TMDL be developed to correct each cause of impairment. TMDLs must document the nature of the water quality impairment, determine the maximum amount of a pollutant which can be discharged and still meet standards, and identify allowable loads from the contributing sources. The elements of a TMDL include a problem statement, description of the desired future condition (numeric target), pollutant source analysis, load allocations, description of how allocations relate to meeting targets, and margin of safety.

### **CWA Section 305(b) Requirements**

The 1972 amendments to the Clean Water Act also include Section 305(b). The regulations implementing Section 305(b) require states to develop an inventory of the water quality of all water bodies in the state and to submit an updated report to the EPA every two years. This process was established as a means for the EPA and the U. S. Congress to determine the status of the nation's waters.

The 305(b) Report also includes: an analysis of the extent to which water bodies comply with the "fishable/swimmable" goal of the CWA; an analysis of the extent to which the elimination of the discharge of pollutants and a level of water quality achieving the "fishable/swimmable" goal have been or will be attained, with recommendations of additional actions necessary to achieve this goal; an estimate of a) the environmental impact, b) the economic and social costs, c) the economic and social benefits, and d) the estimated date of such achievement; and finally, a description of the nature and extent of nonpoint sources of pollutants, and recommendations of programs needed to control them- including an estimate of the costs of implementing such programs.

### **Integrated Report Guidance**

The US Environmental Protection Agency (USEPA) issued guidance (USEPA, 2005) for the development of an Integrated Water Quality Monitoring and Assessment Report (Integrated Report) by the States. This guidance recommends that States integrate their Water Quality Inventory Report (Section 305(b) of the CWA) and their Impaired Waterbodies List (Section 303(d) of the CWA). The Integrated Report is intended to provide an effective tool for maintaining high quality waters and improving the quality of waters that do not attain water quality standards. The Integrated Report will also provide water resources managers and citizens with detailed information regarding the following:

- Delineation of water quality assessment units providing geographic display of assessment results
- Progress toward achieving comprehensive assessment of all waters
- Water quality standards attainment status
- Methods used to assess water quality standards attainment status
- Additional monitoring needs and schedules
- Pollutants and watersheds requiring Total Maximum Daily Loads (TMDLs)
- Pollutants and watersheds requiring alternative pollution control measures
- Management strategies (including TMDLs) under development to attain water quality standards
- TMDL development schedules

The Integrated Report will streamline water quality reporting since data sources and assessment methods will be described in detail, providing a sound technical basis for assessment decisions. Assessment results will also be

conveyed in a spatial context, allowing a clearer picture of water quality status and issues. Monitoring needs and schedules will be described, facilitating the articulation of monitoring priorities and identifying opportunities for cooperation with other agencies and watershed partners. TMDL needs and schedules will be defined to convey plans for water quality improvements. The public participation aspects will provide opportunities for data submittal and open discussion of water quality assessment methods and results.

The Integrated Report combines the non-regulatory requirements of the Water Quality Inventory Report (305b) with regulation driven List of Impaired Waterbodies (303d) (i.e., only the latter mandates TMDL development). Successful integration into a single report requires a careful meshing of requirements and procedures. In general, Category 5 of the Integrated Report satisfies USEPA reporting requirements under Section 303d (Impaired Waterbodies) and combined with the remaining Categories document assessment under Section 305b (Water Quality Inventory). Therefore, the regulatory requirements (i.e., EPA approval and adoption; public participation, etc.) for 303d impaired waterbodies listing only apply to Category 5 of the Integrated Report.

The methods used to develop the 2008 Integrated Report (and subsequent Reports) are described in the Continuing Planning Process (CPP). One goal of the CPP is to provide an objective and scientifically sound waterbody assessment listing methodology including:

- A description of the data that the State will use to assess attainment of surface water quality standards
- The quality assurance aspects of the data
- A detailed description of the methods used to evaluate water quality standards attainment
- The placement of waterbodies in one of 5 Categories:

**Category 1 - Attaining the water quality standard and no use is threatened.**

Waterbodies listed in this category are characterized by data and information that meet the requirements of the CPP to support a determination that the water quality standard is attained and no use is threatened. Consideration will be given to scheduling these waterbodies for future monitoring to determine if the water quality standard continues to be attained.

**Category 2 - Attaining some of the designated uses; no use is threatened; and insufficient or no data and information is available to determine if the remaining uses are attained or threatened.**

Waterbodies listed in this category are characterized by data and information which meet the requirements of the CPP to support a determination that some, but not all, uses are attained and none are threatened. Attainment status of the remaining uses is unknown because there is insufficient or no data or information. Monitoring shall be scheduled for these waterbodies to determine if the uses previously found to be in attainment remain in attainment, and to determine the attainment status of those uses for which data and information was previously insufficient to make a determination.

**Category 3 - Insufficient or no data and information to determine if any designated use is attained.**

Waterbodies are listed in this category when the data or information to support an attainment determination for any use is not available, consistent with the requirements of the CPP. To assess the attainment status of these waterbodies, supplementary data and information shall be obtained, or monitoring shall be scheduled as needed.

**Category 4 - Impaired or threatened for one or more designated uses but does not require the development of a TMDL.****4A - TMDL has been completed.**

Waterbodies are listed in this subcategory once all TMDL(s) have been developed and approved by EPA that, when implemented, are expected to result in full attainment of the standard. Where more than one pollutant is associated with the impairment of a waterbody, the waterbody will remain in Category 5 until all TMDLs for each pollutant have been completed and approved by EPA. Monitoring shall be scheduled for these waterbodies to verify that the water quality standard is met when the water quality management actions needed to achieve all TMDLs are implemented.

**4B - Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future.**

Consistent with the regulation under 130.7(b)(i),(ii), and (iii), waterbodies are listed in this subcategory when other pollution control requirements required by local, state, or federal authority are stringent enough to implement any water quality standard (WQS) applicable to such waters. These requirements must be specifically applicable to the particular water quality problem. Monitoring shall be scheduled for these waterbodies to verify that the water quality standard is attained as expected.

**4C - Impairment is not caused by a pollutant.**

Waterbodies are listed in this subcategory if the impairment is not caused by a pollutant. Scheduling of these waterbodies for monitoring to confirm that there continues to be no pollutant-caused impairment and to support water quality management actions necessary to address the cause(s) of the impairment, shall be considered.

**Category 5 - The water quality standard is not attained. The waterbody is impaired or threatened for one or more designated uses by a pollutant(s), and requires a TMDL.**

This category constitutes the Section 303(d) list of waters impaired or threatened by a pollutant(s) for which one or more TMDL(s) are needed. A waterbody is listed in this category if it is determined, in accordance with the CPP, that a pollutant has caused, is suspected of causing, or is projected to cause an impairment. Where more than one pollutant is associated with the impairment of a single waterbody, the waterbody will remain in Category 5 until TMDLs for all pollutants have been completed and approved by EPA. For waterbodies listed in this category, monitoring schedules shall be provided that describe when data and information will be collected to support TMDL establishment and to determine if the standard is attained. While the waterbody is being monitored for a specific pollutant to develop a TMDL, the watershed shall also be monitored to assess the attainment status of other uses. A schedule for the establishment of TMDLs for all waters in Category 5 shall be submitted. This schedule shall reflect the priority ranking of the listed waters. Category 5 waterbodies are further divided into the following subcategories:

**5A - TMDL is underway or will be scheduled.****5B - A review of the water quality standards will be conducted before a TMDL is scheduled.****5C - Additional data and information will be collected before a TMDL or review of the water quality standards is scheduled.**

The CPP will provide a companion to the 2008 Integrated Report. It is anticipated that this will be a living document and will be modified, as appropriate, to accompany subsequent Integrated Reports.

Oklahoma's comprehensive waterbody category list is available in Appendix B. Category 5 waterbodies can be viewed exclusively in Appendix C.



## Synopsis

During the 2007/2008 reporting cycle, there were a total of 4,064 waterbodies delineated into the Oklahoma Assessment Database (ADB). These waters include approximately 637,326 lake acres, and 32,349 river and stream miles, of which approximately 517 miles form the border with the State of Texas.

The water quality data used in this report was collected by the Oklahoma Conservation Commission (OCC), Oklahoma Department of Environmental Quality (DEQ), Oklahoma Corporation Commission (Corp. Comm.), Oklahoma Water Resources Board (OWRB), United States Geological Survey, Tulsa Public Works & Development Department, Cherokee Nation, and citizens of the state. Only data collected prior to April 30, 2007 was utilized for this report.

Data used in this report came from several sources, including the *Toxics Monitoring Survey of Oklahoma Reservoirs* (OSDH, 1995), *Nonpoint Source Pollution Assessment Report (Section 319(h))* (OCC, 1988, 1994), *Clean Lakes Programs (Section 314)* (OCC & OWRB), *Lake Water Quality Assessment Report* (OCC & OWRB, 1994), *The State of Oklahoma 2006 Water Quality Assessment Integrated Report* (ODEQ, 2006), *Data Gaps Monitoring Projects* (OCC 2002, 2003), *Beneficial Use Monitoring Program*, *Rotating Basin Monitoring Program*, intensive and rapid bio-assessment surveys, fish and wildlife kill reports, spill reports, and citizen complaints. Historical data and assessments (prior to May 1, 2002) were only used when insufficient current data was available to assess a waterbody.

The State considers data gathered by interested citizens of the state of Oklahoma to be an important part of the water quality assessment process. Two organizations that help by contributing to this process are Blue Thumb and Oklahoma Water Watch. Volunteers collect water quality samples and deliver those samples to water quality professionals for analysis and assessment. For more information on Blue Thumb, contact the Oklahoma Conservation Commission. For more information on Oklahoma Water Watch, contact the Oklahoma Water Resources Board.

Additional monitoring will allow the state agencies to refine and modify the descriptions of the quality of the state's waters. This report reflects water quality determinations made in the past and such determinations will be confirmed or modified, as additional monitoring data becomes available. Where some waterbodies are indicated to be impaired, and suspected cause of impairment is listed, this information is also subject to confirmation or modification based on additional studies and evaluation by state agencies.

Table 1 shows the size and number of lakes in the state of Oklahoma designated as one of the five available categories outlined in the Integrated List Guidance above, while Table 2 does the same for river and stream miles.

**TABLE 1. LAKE CATEGORY SUMMARY**

| Category | Size (Acres) | Number of Waterbodies |
|----------|--------------|-----------------------|
| 1        | 0            | 0                     |
| 2        | 22,052       | 5                     |
| 3        | 15,150       | 269                   |
| 4A       | 0            | 0                     |
| 4B       | 0            | 0                     |
| 4C       | 0            | 0                     |
| 5A       | 598,595      | 145                   |
| 5B       | 0            | 0                     |
| 5C       | 1,350        | 1                     |

**TABLE 2. RIVER AND STREAM CATEGORY SUMMARY**

| Category | Size (Miles) | Number of Waterbodies |
|----------|--------------|-----------------------|
| 1        | 121          | 5                     |
| 2        | 1,922        | 165                   |
| 3        | 19,838       | 2,848                 |
| 4A       | 564          | 29                    |
| 4B       | 0            | 0                     |
| 4C       | 0            | 0                     |
| 5A       | 9,283        | 505                   |
| 5B       | 135          | 11                    |
| 5C       | 486          | 81                    |

Table 3 details the attainment status of each designated beneficial use assigned to lake acres in Oklahoma, while Table 4 does the same for river and stream miles. Each beneficial use for a waterbody must have only one attainment status associated with that use: supporting, not supporting, insufficient information, or not assessed (no information). The methodology for assigning the attainment status of a beneficial use of a waterbody is outlined in the Assessment Methodology and Summary Data section of this report.

**TABLE 3. LAKE BENEFICIAL USE SUPPORT SUMMARY**

| Lake Acres                      |            |                       |                     |                   |                             |
|---------------------------------|------------|-----------------------|---------------------|-------------------|-----------------------------|
| Use                             | Total Size | Size Fully Supporting | Size Not Supporting | Size Not Assessed | Size with Insufficient Info |
| Aesthetic                       | 637,326    | 279,158               | 97,755              | 14,834            | 245,579                     |
| Agriculture                     | 637,326    | 464,606               | 15,955              | 15,149            | 141,616                     |
| Fish Consumption                | 637,326    | 0                     | 0                   | 637,326           | 0                           |
| Warm Water Aquatic Community    | 637,326    | 9,112                 | 585,663             | 14,843            | 27,708                      |
| Navigation                      | 84,440     | 84,440                | 0                   | 0                 | 0                           |
| Primary Body Contact Recreation | 637,326    | 139,676               | 21,780              | 15,184            | 460,686                     |
| Public and Private Water Supply | 593,714    | 165                   | 66,222              | 22,659            | 504,668                     |
| Sensitive Water Supply          | 135,825    | 0                     | 0                   | 135,825           | 0                           |

**TABLE 4. RIVER AND STREAM BENEFICIAL USE SUPPORT SUMMARY**

| USE   | River Miles |                       |                     |                   |                             |
|---|-------------|-----------------------|---------------------|-------------------|-----------------------------|
|   | Total Size  | Size Fully Supporting | Size Not Supporting | Size Not Assessed | Size with Insufficient Info |
| Aesthetic                                     | 32,325      | 4,756                 | 501                 | 17,584            | 9,484                       |
| Agriculture                                   | 32,269      | 7,258                 | 3,628               | 17,739            | 3,645                       |
| Emergency Water Supply                        | 1,520       | 1,520                 | 0                   | 0                 | 0                           |
| Fish Consumption                              | 32,336      | 1,748                 | 1,084               | 28,419            | 1,085                       |
| Cool Water Aquatic Community Subcategory      | 1,595       | 401                   | 428                 | 571               | 195                         |
| Habitat Limited Aquatic Community Subcategory | 716         | 24                    | 166                 | 414               | 111                         |
| Trout Fishery                                 | 34          | 0                     | 1                   | 24                | 9                           |
| Warm Water Aquatic Community Subcategory      | 30,084      | 1,904                 | 5,833               | 16,364            | 5,984                       |
| Navigation                                    | 213         | 213                   | 0                   | 0                 | 0                           |
| Primary Body Contact Recreation               | 31,250      | 756                   | 7,699               | 21,504            | 1,291                       |
| Public and Private Water Supply               | 14,788      | 1,068                 | 395                 | 6,517             | 6,808                       |
| Sensitive Water Supply                        | 1,510       | 0                     | 0                   | 1,510             | 0                           |
| Secondary Body Contact Recreation             | 1,118       | 123                   | 163                 | 671               | 161                         |

Table 5 shows the number of lake acres impaired by specific pollutant and Table 6 shows the same for the number of river and stream miles.

**TABLE 5. LAKE ACRES IMPAIRED BY SPECIFIC POLLUTANT**

| Cause                  | Size (Acres) |
|------------------------|--------------|
| Oxygen, Dissolved      | 389,498      |
| Turbidity              | 370,016      |
| Color                  | 89,117       |
| Chlorophyll- $\alpha$  | 66,222       |
| pH                     | 30,953       |
| Enterococcus           | 21,780       |
| Total Phosphorus       | 15,877       |
| Total Dissolved Solids | 15,015       |
| Chloride               | 8,700        |
| Sulfates               | 6,330        |

**TABLE 6. RIVER AND STREAM MILES IMPAIRED BY SPECIFIC POLLUTANT**

| <b>Impairment</b>               | <b>Size (Miles)</b> |
|---------------------------------|---------------------|
| Enterococcus                    | 6,977               |
| Turbidity                       | 4,012               |
| Escherichia coli                | 3,495               |
| Fecal Coliform                  | 3,094               |
| Dissolved Oxygen                | 2,547               |
| Total Dissolved Solids          | 2,277               |
| Chloride                        | 2,137               |
| Sulfates                        | 1,982               |
| Lead                            | 1,437               |
| pH                              | 762                 |
| Fishes Bioassessments (Streams) | 633                 |
| Oil and Grease                  | 545                 |
| Selenium                        | 273                 |
| Phosphorus (Total)              | 160                 |
| Sedimentation/Siltation         | 151                 |
| Nitrates                        | 118                 |
| Ammonia (Un-ionized)            | 115                 |
| Cadmium                         | 101                 |
| Copper                          | 95                  |
| Zinc                            | 83                  |
| Chlorpyrifos                    | 42                  |
| Chromium (Total)                | 42                  |
| Diazinon                        | 29                  |
| DDT                             | 19                  |
| Toxaphene                       | 19                  |
| Arsenic                         | 6                   |
| Barium                          | 4                   |
| Total Coliform                  | 4                   |
| Dieldrin                        | 4                   |
| Silver                          | 2                   |

Table 7 shows the number of lake acres impaired by potential sources, and Table 8 shows the number of river and stream miles impaired by potential sources.

**TABLE 7. LAKE ACRES IMPAIRED BY POTENTIAL SOURCE**

| Potential Source   | Size (Acres) |
|--|--------------|
| Source Unknown   | 600,090      |
| Rangeland Grazing  | 45,623       |
| Wildlife Other than Waterfowl  | 45,623       |
| Grazing in Riparian or Shoreline Zones                                       | 37,183       |
| Wastes from Pets   | 20,553       |
| On-site Treatment Systems (Septic Systems and Similar Decentralized Systems) | 17,945       |
| Animal Feeding Operations (NPS)  | 17,914       |
| Impacts from Land Application of Wastes                                      | 17,914       |
| Sources Outside State Jurisdiction or Borders                                | 17,914       |
| Petroleum/Natural Gas Activities (Legacy)                                    | 35           |
| Silviculture Harvesting  | 25           |

**TABLE 8. RIVER AND STREAM MILES IMPAIRED BY POTENTIAL SOURCE**

| Potential Source   | Size (Miles) |
|--|--------------|
| Source Unknown   | 9,898        |
| Grazing in Riparian or Shoreline Zones                                       | 7,091        |
| Rangeland Grazing  | 6,905        |
| Wildlife Other than Waterfowl  | 6,887        |
| On-site Treatment Systems (Septic Systems and Similar Decentralized Systems) | 6,740        |
| Wastes from Pets   | 4,873        |
| Residential Districts  | 4,486        |
| Highway/Road/Bridge Runoff (Non-construction related)                        | 4,111        |
| Non-irrigated Crop Production  | 4,006        |
| Municipal Point Source Discharges  | 3,274        |
| Impacts from Land Application of Wastes                                      | 2,513        |
| Petroleum/Natural Gas Activities   | 2,207        |
| Total Retention Domestic Sewage Lagoons                                      | 1,245        |
| Clean Sediments  | 1,094        |
| Agriculture  | 1,091        |
| Other Spill Related Impacts  | 676          |
| Permitted Runoff from Confined Animal Feeding Operations (CAFOs)             | 618          |
| Animal Feeding Operations (NPS)  | 510          |
| Industrial Point Source Discharge  | 465          |
| Atmospheric Deposition - Acidity   | 380          |
| Mine Tailings  | 236          |
| Sources outside State Jurisdiction or Borders                                | 177          |



| Potential Source  | Size (Miles) |
|---|--------------|
| Municipal (Urbanized High Density Area)                             | 170          |
| Landfills   | 167          |
| Discharges from Municipal Separate Storm Sewer Systems (MS4)        | 127          |
| Silviculture Harvesting   | 95           |
| Dredging (E.g., for Navigation Channels)                            | 67           |
| Land Application of Wastewater Biosolids (Non-agricultural)         | 46           |
| Releases from Waste Sites or Dumps                                  | 33           |
| Impacts from Abandoned Mine Lands (Inactive)                        | 30           |
| Leaking Underground Storage Tanks                                   | 28           |
| Natural Sources   | 21           |
| Spills from Trucks or Trains  | 17           |
| Discharges from Biosolids (SLUDGE) Storage, Application or Disposal | 17           |
| Surface Mining  | 14           |
| CERCLA NPL (Superfund) Sites  | 12           |
| Acid Mine Drainage  | 8            |

## **Surface Water Quality**

Oklahoma's Water Quality Standards (WQS) are set forth under statutory authority of the OWRB authorized under 82 O.S. § 1085.30. Under these statutes, OWRB "is required to set water quality standards which are practical and in the best public interest and to classify the state's waters with respect to their best present and future uses. These WQS are designed to enhance the quality of the waters, to protect their beneficial uses, and to aid in the prevention, control and abatement of water pollution in the State of Oklahoma" (OWRB, 2006). The WQS have established designated beneficial uses and standards for all of Oklahoma's waters.

The overall support and attainment of the "fishable/swimmable" goals of the CWA is based upon "total waters." The EPA requires all states to report their attainment of the goals of the CWA based on total waters. Relying solely upon this portrayal probably overly inflates estimates of the impaired and threatened conditions of the state's waters since monitoring efforts are typically focused on known problem areas. It would be too cost prohibitive to assess all of the waters within the state. Therefore, all assessment work performed in the state is conducted in a manner that will best utilize available funding resources. For lake total water reporting, the acreage includes Natural Resource Conservation Service (NRCS) (formerly the Soil Conservation Service) assisted farm ponds. Oklahoma lists approximately 1,041,884 total lake acres for the state. Of this number, 330,000 acres comprise approximately 220,000 NRCS assisted farm ponds. These farm ponds are not included in EPA's total water database. Although not considered as "significant lakes," the state considers them as important natural resources for the agricultural and rural communities. These farm ponds provide a significant amount of water for livestock, a source of primary recreation for many, used as flood control devices, sediment catchments, and add to the recharge of groundwater aquifers.

Canals, laterals and most all of the wetlands have not been assessed for the goals of the CWA nor have they been assessed for their beneficial uses. Canals and laterals are manmade watercourses and have not been included in the Appendix A of the WQS. By default, these waters would be assigned primary protection under the 2006 WQS (OWRB, 2006). Due to a lack of funding, no assessment projects have been initiated on these types of waterbodies. Wetlands have not been assigned specific WQS and therefore fall under the same scenario as canals and laterals. Several projects and ventures have been initiated to inventory the wetlands within the state, but little assessment work has been completed.

The major factors affecting the overall use support of the rivers and streams of the state were from the following causes: pathogens, mineralization, and turbidity. The major factors affecting the overall use support of the lakes of the state were from the following causes: oxygen depletion, turbidity, and color.

All unlisted waters, not included in Appendix A of the WQS, are assumed to have the beneficial uses consistent with the CWA's primary protection requirements. All beneficial use determinations are subject to administrative proceedings including the public hearing process.

Currently, the DEQ develops draft National Pollutant Discharge Elimination System (NPDES) permits for the control and abatement of municipal and industrial pollution. The DEQ issues the final NPDES permit for municipalities and industrial dischargers. Permit compliance is monitored by both the discharger and inspectors for the DEQ.

Since the inception of the CWA in 1972 and its amendments, EPA administered the National Pollutant Discharge Elimination System (NPDES) program, which addresses the management of industrial and municipal wastewater discharges. Previously, the functions related to wastewater were found in the OSDH, for municipal wastewater, and the OWRB for industrial wastewater. The scattering of the NPDES jurisdiction between two agencies that were independently pursuing delegation of their portion from the NPDES program did not appear to be conducive for Oklahoma to assume the program from EPA. Consolidation of the two agencies into the DEQ in July 1993 solved this problem and the work began for the agency to develop its required program documents, rules and statute changes in preparation of submitting its formal NPDES application to EPA, Region 6 office in Dallas, Texas.

The DEQ obtained NPDES program assumption from EPA on November 19, 1996. This is indicative of the agency having jurisdiction over the basic permitting, compliance and enforcement elements of the NPDES program, in addition to having authority over toxicity reduction, sewage sludge and pretreatment programs. In September 1997, program assumption to issue storm water permits was obtained from EPA.

## **Ground Water Quality**

The goals of the Safe Drinking Water Act (SDWA) are that the nation's groundwater be free of harmful levels of contaminants and they set national standards for drinking water. Several state agencies are involved in the protection of Oklahoma's groundwater. These include the DEQ, ODAFF, Corporation Commission, OCC, and the OWRB. The DEQ is designated as the lead agency for the Wellhead Protection Program (WHPP).

There are instances of man induced groundwater pollution in the state. Except in a few old oilfields, they appear to be isolated instances and not general contamination of groundwater drinking water supplies. Historical data indicates water is of good quality from most aquifers.

Oklahoma has Groundwater Standards located in OAC 785:45-7. Designated beneficial uses for the groundwaters of the state are determined by Total Dissolved Solids (TDS). Groundwater with a mean concentration of TDS of less than 3,000 milligrams per liter has assigned beneficial uses of Public and Private Water Supply, Agriculture, and Industrial and Municipal Process and Cooling Water. Groundwater with a mean concentration of TDS of greater than or equal to 3,000 milligrams per liter but less than 10,000 milligrams per liter has assigned beneficial uses of Agriculture and Industrial and Municipal Process and Cooling Water. Groundwater is protected to background quality and, once polluted as a result of human activities, is restored to a quality to support its designated beneficial uses. Ensuring that groundwater meets Water Quality Standards is an important reason for developing and continuing a Water Quality monitoring Program.

## **Background**

### **Diversity and Ecology**

Oklahoma is a diverse state in its ecology, geology, hydrology, and its rainfall. Oklahoma is comprised of the following ecoregions: Arkansas Valley, Boston Mountains, Central Great Plains, Central Irregular Plains, Central Oklahoma/Texas Plains, Flint Hills, Ouachita Mountains, Ozark Highlands, South Central Plains, Southwestern Tablelands, and Western High Plains. These ecoregions (Figure 1) range from short grass prairies to Loblolly Pine (*Pinus taeda*)/Short-leaf Pine (*P. echinata*)/Oak (*Quercus spp.*) mixed community.

Much of Oklahoma's original plant and some animal species are either extinct or are greatly reduced in their distribution. The reduction in native vegetation is mainly due to cultivation, conversion of native prairie to pasture, timber cutting, and erosion. There are approximately 2,540 species of plants, 81 species of reptiles, 53 species of amphibians, 101 species of mammals, 400 species of birds, and 175 species of fish. Agriculture is the number one land use business in the state. Wheat is the number one cash grain crop grown in Oklahoma. Wheat is valuable during the winter as pasture feed for cattle, sheep and dairy stock. Other important grain crops for the state include fall and spring oats, barley, rye, sorghum, soybeans, and corn. In addition, pecans, fruits, vegetables, cotton, and timber all constitute a significant source of income for the state. Other important agricultural land use practices include cattle, dairy stock, sheep, poultry, and select exotics (e.g., llamas and ostriches).

The latitude and longitude coordinate for the corners of the state, excluding the Panhandle are: Southeast 033°38'15"/ 094°29'08"; Northeast 036°59'54"/094°37'04"; Southwest 034°33'38"/100°00'00"; and Northwest 037°00'00"/100°00'00". The coordinates for the Panhandle are: Southeast 036°30'00"/ 100°00'00"; Northeast 037°00'00"/100°00'00"; Southwest 036°30'00"/103°00'00"; and Northwest 037°00'00"/103°00'00". Oklahoma runs approximately 481.51 miles east to west and 230.16 miles north to south. The surface area of Oklahoma occupies approximately 69,919 square miles or 44,000,000 acres. Oklahoma varies in its elevation from its lowest point of 287 feet above sea level on the Little River in McCurtain County on the border with Arkansas to its highest point of 4,973 feet above sea level, near Black Mesa in Cimarron County on the border with New Mexico. There are ten major geologic provinces in Oklahoma with the Northern Shelf Areas being the largest (Figure 2) (Oklahoma Geological Survey, 1972). Oklahoma is composed of 77 counties with Osage being the largest (Figure 3). Basic statistics on Oklahoma can be found in Table 9.

Information contained in Table 9 came from a variety of sources including the 2000 Oklahoma Census, United States Geological Survey data, the OWRB data, Oklahoma Water Atlas, Reach File 3/Digital Line Graph Data, ground surveys, the Wildlife Department, United States Fish and Wildlife Service, and planimeter data. For the lakes information, Oklahoma uses the information from the *Oklahoma Water Atlas*. Oklahoma's environmental agencies feel that the information contained in the *Oklahoma Water Atlas* better represents the total of lakes and lake acres contained within the state. For the remaining rivers, creeks, canals and laterals we will be using a combination of sources for our data.

The total of fresh-water wetland acres was derived from information obtained from the Wildlife Department and United States Fish and Wildlife Service reports *Riparian Areas of Western Oklahoma* and *Bottomland Hardwoods of Eastern Oklahoma*. These reports contain information on 58 of the 77 counties in the state. The information in Table 9 was derived from taking the total of the largest most recent estimate for each county listed in the two reports. This total underestimates the actual number of wetland acres for the state and should be used with extreme caution when making comparison or trend analysis on Oklahoma's loss of wetlands.

FIGURE 1. ECOREGIONS OF OKLAHOMA

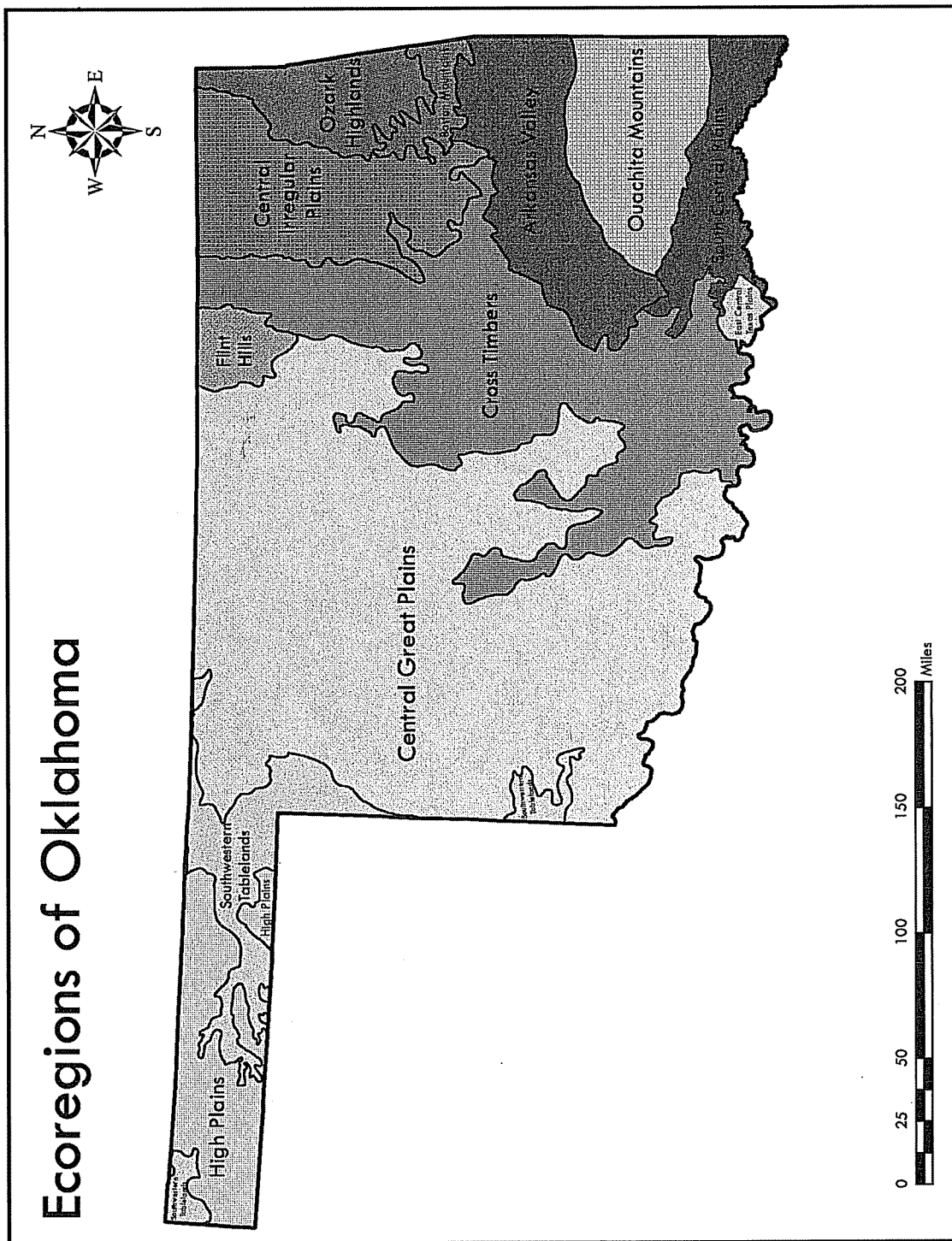




FIGURE 2. OKLAHOMA GEOLOGY

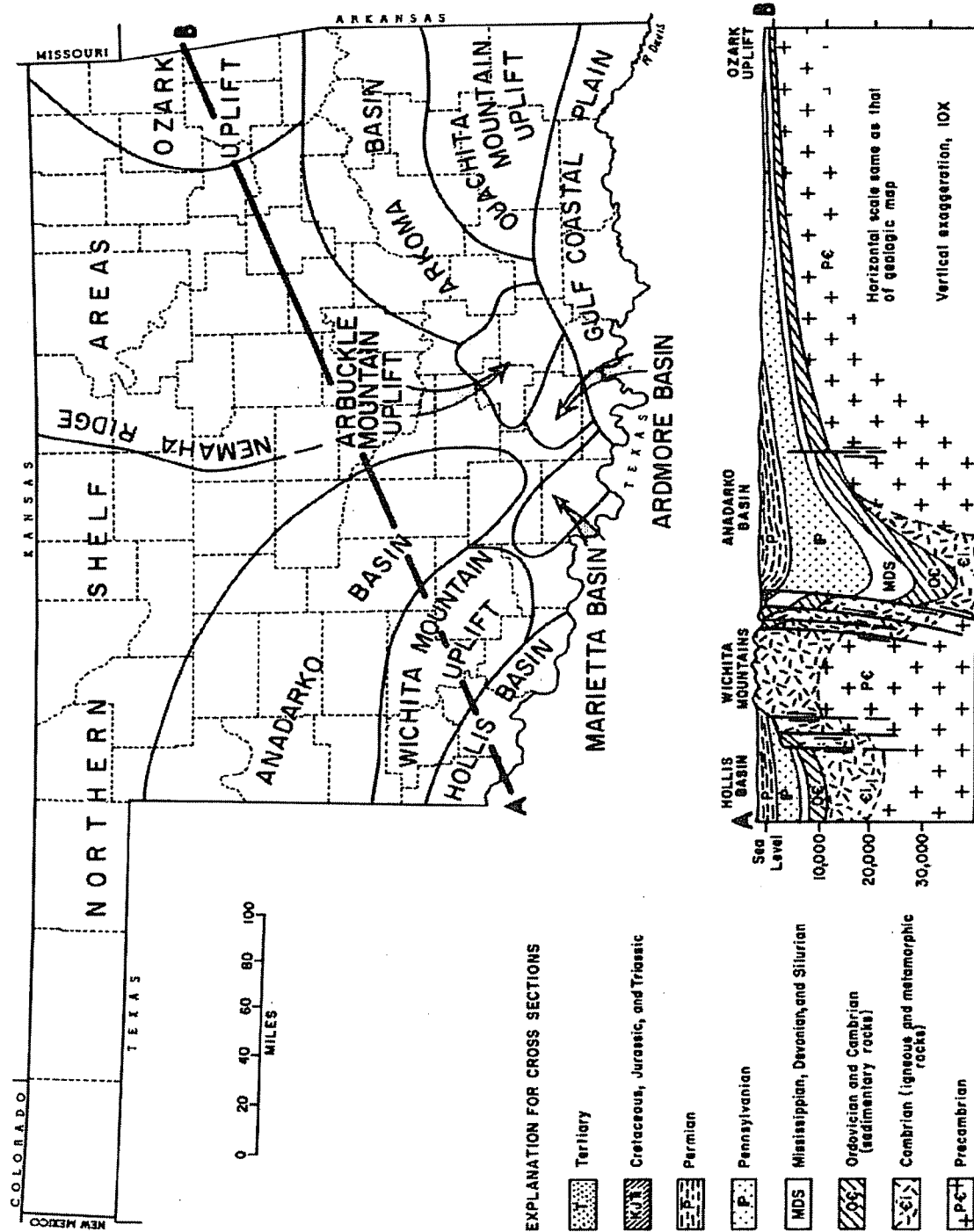
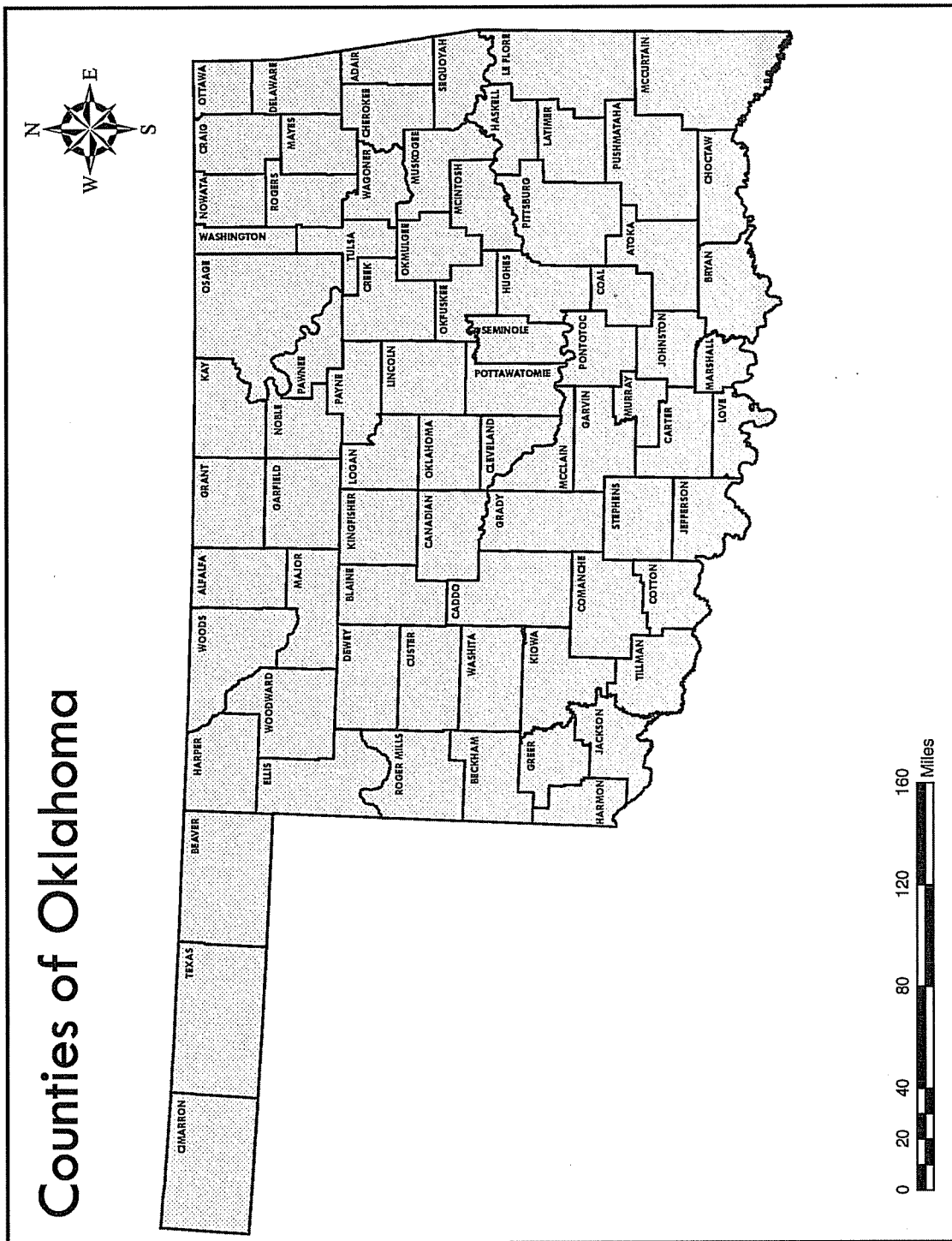




FIGURE 3. OKLAHOMA COUNTIES



**TABLE 9. ATLAS OF OKLAHOMA**

|   |           |
|---|-----------|
| State Population <sup>*</sup>   | 3,617,316 |
| State Surface Area, Square Miles <sup>**</sup>                          | 69,919    |
| Number of Major Watershed Basins  | 7         |
| Total Number of River and Stream Miles <sup>*</sup>                     | 78,778    |
| Number of Perennial River and Stream Miles <sup>*</sup>                 | 22,386    |
| Number of Intermittent Stream Miles <sup>*</sup>                        | 55,413    |
| Number of Canals or Ditches <sup>*</sup>                                | 175       |
| Number of River Border Miles <sup>***</sup>                             | 517       |
| Total Number of Lakes/Reservoirs/Playa/Ponds <sup>**</sup>              | 224,948   |
| Number of Large Lakes <sup>**</sup>                                     | 34        |
| Number of Public & Private Lakes <sup>**</sup>                          | 2,303     |
| Number of Watershed Protection Lakes <sup>**</sup>                      | 1,964     |
| Number of Playa Lakes (wet season only) <sup>**</sup>                   | 585       |
| Number of Oxbow Lakes (≥ 10 Acres) <sup>**</sup>                        | 62        |
| Number of Farm Ponds (Soil Conservation Service assisted) <sup>**</sup> | 220,000   |
| Total Number of Lakes/Reservoirs/Playa/Ponds Acres <sup>**</sup>        | 1,041,884 |
| Major Lake Acres <sup>**</sup>  | 555,450   |
| Public & Private Lake Acres <sup>**</sup>                               | 89,836    |
| Watershed Protection Lake Acres <sup>**</sup>                           | 54,261    |
| Playa Lakes Acres <sup>**</sup>   | 9,572     |
| Oxbow Lake Acres <sup>**</sup>  | 2,765     |
| Farm Pond Acres <sup>**</sup>   | 330,000   |
| Total Number of Freshwater Wetland Acres <sup>***</sup>                 | 733,895   |

- <sup>\*</sup> 2007 US Census Bureau Estimate
- <sup>\*\*</sup> Based upon United States Geological Survey information
- <sup>\*\*\*</sup> OWRB Data
- <sup>\*</sup> Reach File 3/Digital Line Graph Data
- <sup>\*\*</sup> Oklahoma Water Atlas, 1990
- <sup>\*\*\*</sup> Estimates compiled from the Wildlife Department & U.S. Fish & Wildlife Service

## **Climate**

Oklahoma has a continental type of climate. There are pronounced seasonal and geographical ranges in both temperature and precipitation. Average annual temperature varies from 53.6°F in the western part of the Panhandle up to 63.8°F in the southeast part of the state. Annual rainfall varies from approximately 17 inches in the far western part of the Panhandle to over 55 inches per year near the LeFlore County/McCurtain County/Arkansas border. The average growing season varies from 180 days in the Panhandle to 240 days in the southeast corner. Typically, 75% of Oklahoma's annual precipitation falls during the growing season.

## **Water Pollution Control Programs**

The myriad and complex water quality problems remaining today require a more comprehensive approach to find workable and effective solutions. As we continue to have success reducing impacts from point sources, pollution from nonpoint sources takes on more significance. Non-traditional concerns such as habitat degradation and conservation of biological diversity also call for a comprehensive approach.

The watershed approach provides such a management framework. Utilizing support from the 104(b)(3) program, Oklahoma has taken the first steps to implement the watershed approach for water quality management in the state. The following accomplishments have been achieved:

- A Whole Basin Planning Approach Working Group was established to coordinate planning and implementation of the watershed approach in Oklahoma. Representatives of the various state and federal agencies with a role in water quality management were represented on the Working Group.
- A cooperative project with USGS produced a new digital elevation model and digital watershed maps for the state. Existing 8-digit cataloging units were subdivided into 11-digit watersheds. These watershed maps are the basis for the state program. The maps have been published on CD-ROM and are available to all agencies and the public.
- Utilizing the new watershed boundaries, the Working Group delineated 11 Watershed Management Units that are used to implement the watershed approach. The intent is that planning, monitoring, permitting, and other water quality programs will eventually be coordinated and organized at this scale when the watershed approach is fully implemented.
- Accurate locational data on all dischargers has been gathered using the Global Positioning System. These data have been built into a GIS-compatible format for analysis. Links to permitting and monitoring data in the PCS system have been established for analysis and assessment purposes.
- A technical committee was established to develop an implementation plan to utilize the new Watershed Management Units and watershed boundaries in the various reporting and planning programs. Water Quality Standards, the 303(d) list, the 208 Plan, and the 305(b) Report were targeted for this effort.

### **Water Quality Standards Program**

Oklahoma's WQS are set forth under statutory authority of the OWRB authorized under 82 O.S. § 1085.30. Under these statutes, the OWRB "is required to set water quality standards which are practical and in the best public interest and to classify the state's waters with respect to their best present and future uses. These WQS are designed to enhance the quality of the waters, to protect their beneficial uses, and to aid in the prevention, control and abatement of water pollution in the State of Oklahoma" (OWRB, 2006). The WQS have established designated beneficial uses and standards for all of Oklahoma's waters.

Oklahoma defines waters of the state to mean "all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion thereof 82 O.S. § 1084.2(3)."

Much of the work developing WQS over the past three decades has been dedicated to the control of point source discharges through chemical-specific criteria and permit limits. Over the past five years, biological water quality criteria have also been pursued.

Potential uses of biocriteria, as they pertain to Oklahoma's WQS, are numerous and far-reaching. Upon completion, biocriteria and their implementation procedures should be incorporated into the OWRB Rules and into Oklahoma's Continuing Planning Process (CPP) document. They should then be used as an assessment tool.

The current biological thresholds will allow state agencies and others to consistently analyze the biological community in terms of the Fish and Wildlife Beneficial Use. These procedures will, for the first time, allow for consistent examination of biological communities with a minimum of subjectivity and judgment. Ongoing work in this area of biocriteria development will eventually provide statewide coverage and a biological Use Support Assessment Protocols for all ecoregions in Oklahoma.

Candidate reference streams have been selected in the Ouachita Mountain, Arkansas Valley, Boston Mountains, Ozark Highlands, and Central Irregular Plains ecoregions. Previous work has determined reference taxa for these

ecoregions and these lists are currently being validated through thorough stream assessments. Following are details of the ecoregions listed above (OWRB, 2006):

**Special provisions for Ouachita Mountains wadable streams.**

The determination of whether the use of Fish and Wildlife Propagation is supported for wadable streams located in the Ouachita Mountains ecoregion shall be made according to the application of Appendix C of this Chapter, together with this subsection, as follows:

- (1) Where designated, the subcategory of Warm Water Aquatic Community shall be deemed fully supported if the application of Appendix C produces a score of 35 or more. Such subcategory shall be deemed not supported if the application of Appendix C produces a score of 24 or less. If a score is 25 to 34 inclusive, the issue of whether this subcategory is supported shall be deemed undetermined.
- (2) Where designated, the subcategory of Habitat Limited Aquatic Community shall be deemed fully supported if the application of Appendix C produces a score of 27 or more. Such subcategory shall be deemed not supported if the application of Appendix C produces a score of 18 or less. If a score is 19 to 26 inclusive, the issue of whether this subcategory is supported shall be deemed undetermined.

**Special provisions for Arkansas Valley wadable streams.**

The determination of whether the use of Fish and Wildlife Propagation is supported for wadable streams located in the Arkansas Valley ecoregion shall be made according to the application of Appendix C of this Chapter, together with this subsection, as follows:

- (1) Where designated, the subcategory of Warm Water Aquatic Community shall be deemed fully supported if the application of Appendix C produces a score of 35 or more. Such subcategory shall be deemed not supported if the application of Appendix C produces a score of 24 or less. If a score is 25 to 34 inclusive, the issue of whether this subcategory is supported shall be deemed undetermined.
- (2) Where designated, the subcategory of Habitat Limited Aquatic Community shall be deemed fully supported if the application of Appendix C produces a score of 27 or more. Such subcategory shall be deemed not supported if the application of Appendix C produces a score of 18 or less. If a score is 19 to 26 inclusive, the issue of whether this subcategory is supported shall be deemed undetermined.

**Special provisions for Boston Mountains and Ozark Highlands wadable streams.**

The determination of whether the use of Fish and Wildlife Propagation is supported for wadable streams located in the Boston Mountains and Ozark Highlands ecoregions shall be made according to the application of Appendix C of this Chapter, together with this subsection, as follows:

- (1) Where designated, the subcategory of Cool Water Aquatic Community shall be deemed fully supported if the application of Appendix C produces a score of 37 or more. Such subcategory shall be deemed not supported if the application of Appendix C produces a score of 29 or less. If a score is 30 to 36 inclusive, the issue of whether this subcategory is supported shall be deemed undetermined.
- (2) Where designated, the subcategory of Warm Water Aquatic Community shall be deemed fully supported if the application of Appendix C produces a score of 31 or more. Such subcategory shall be deemed not supported if the application of Appendix C produces a score of 22 or less. If a score is 23 to 30 inclusive, the issue of whether this subcategory is supported shall be deemed undetermined.

**Special provisions for Central Irregular Plains wadable streams.**

The determination of whether the use of Fish and Wildlife Propagation is supported for wadable streams located in the Central Irregular Plains ecoregion shall be made according to the application of Appendix C of this Chapter, together with this subsection, as follows:

- (1) Where designated, the subcategory of Cool Water Aquatic Community shall be deemed fully supported if the application of Appendix C produces a score of 35 or more. Such subcategory shall be deemed not supported if the application of Appendix C produces a score of 28 or less. If a score is 29 to 34 inclusive, the issue of whether this subcategory is supported shall be deemed undetermined.
- (2) Where designated, the subcategory of Warm Water Aquatic Community shall be deemed fully supported if the application of Appendix C produces a score of 30 or more. Such subcategory shall be deemed not supported if the application of Appendix C produces a score of 22 or less. If a score is 23 to 29 inclusive, the issue of whether this subcategory is supported shall be deemed undetermined.
- (3) Where designated, the subcategory of Habitat Limited Aquatic Community shall be deemed fully supported if the application of Appendix C produces a score of 25 or more. Such subcategory shall be deemed not supported if the application of Appendix C produces a score of 16 or less. If a score is 17 to 24 inclusive, the issue of whether this subcategory is supported shall be deemed undetermined.

**Special provisions for Central Oklahoma - Texas Plains wadable streams.**

The determination of whether the Warm Water Aquatic Community subcategory of the Fish and Wildlife Propagation beneficial use is supported for wadable streams located in the Central Oklahoma - Texas Plains ecoregion shall be made according to the application of Appendix C of this Chapter, together with this subsection, as follows:

- (1) Such subcategory shall be deemed fully supported if the application of Appendix C produces a score of 26 or more.
- (2) Such subcategory shall be deemed not supported if the application of Appendix C produces a score of 19 or less
- (3) If the application of Appendix C produces a score of 20 to 25 inclusive, the issue of whether this subcategory is supported shall be deemed undetermined.

**Special provisions for Central Great Plains wadable streams.**

The subcategory of Warm Water Aquatic Community of the beneficial use of Fish and Wildlife Propagation in the wadable streams located in the Central Great Plains ecoregion shall be deemed fully supported if the application of Appendix C of this Chapter produces a score of 22 or more. Such subcategory shall be deemed not supported for the streams in the ecoregion if the application of Appendix C produces a score of 18 or less. If the application of Appendix C produces a score of 19 to 21 inclusive, the issue of whether this subcategory is supported for the streams in this ecoregion shall be deemed undetermined. Provided, however, this subsection does not apply to the area bounded by State Highway 64 on the west, U.S. Highway 62 on the south, U.S. Highway 281 on the east and State Highway 19 on the north.

Oklahoma will be able to monitor biological communities to determine the effectiveness of permit limits and the parameter-specific criteria they are base upon. Incorporation of biological monitoring and biocriteria to evaluate fish and wildlife beneficial use support will help reduce monitoring costs by eliminating otherwise required tests for metals, pesticides, and other toxic substances.

## **Point Source Control Program**

Oklahoma's point source pollution control programs are administered and carried out by the DEQ. The DEQ administers both municipal and industrial dischargers and issues permits. The DEQ is responsible for monitoring the dischargers to ensure compliance with permit limitations and conditions as well as to receive and review the permittee's self-monitoring data.



For industrial dischargers, the DEQ relies on a two-step process for permit development. In the first step, minimum treatment level standards, based on the industry type, are established. These are termed "technology-based limits." The technology-based limits are evaluated to determine if a potential exists to violate the WQS. If the potential exists to violate the WQS, then more stringent "water quality-based limits" will be selected for use in the permit.

Each permit specifies both monitoring and reporting requirements for the facility. The permit gives the effective dates of limits, parameters to be tested, applicable limits for each parameter, frequency of analysis, and sample type of monitoring. Monitoring results are summarized on a monitoring report form and submitted to the DEQ according to the schedule in the permit. All Discharge Monitoring Reports (DMR) and reports from the permittee are reviewed and violations noted. The permittee's compliance is tracked using the Permit Compliance System (PCS). The administrative staff utilizes violation review criteria to screen for significant violations. This screening process assures that limited enforcement resources concentrate on the most significant violations. The following criteria are used to identify significant violations:

- Two or more excursions of 40% or more for inorganic and oxygen demanding pollutants during a six-month period.
- Two or more excursions of 20% or more for toxic pollutants during a six-month period.
- Non-reporting violations.
- Chronic violations, any violation of any monthly effluent limit for any four or more months in a six month period.
- Any effluent violation that causes or has potential to cause a water quality or human health problem.
- Permit schedule violations.
- Violations of enforcement orders
- Any unauthorized bypass, unpermitted discharge, or pass through of pollutants which may cause a water quality or human health problem.
- Construction or modification of sewage treatment works, Publicly Owned Treatment Works conveyance system or industrial wastewater impoundment, without a permit.

The criteria used for determining significant violations are based on the EPA's current policy, which is used to evaluate all major and minor permits under the DEQ's jurisdiction.

Quality assurance strategies are used by the DEQ to ensure that facilities comply with their permit. Field inspections are conducted on a regular basis with samples of the discharge collected for analyses. The Customer Assistance Division maintains the laboratory certification program. This program assures that industries follow all Quality Assurance and Quality Control methods when analyzing their effluent samples. All permits require that all analyses used to determine permit compliance be performed by a DEQ certified lab.

The limits for the permits are "water quality based" and are designed to protect the beneficial uses of the receiving stream. All permits are tracked through the state's Water Quality Management Plan. The plan is updated as needed. The updates to the Plan occur on a regular basis with the last full annual update to the Plan being in 1984.

Each permit is written for a single facility. Most facilities have only one discharge; however, some do have multiple discharges. The information found in each permit includes: latitude and longitude for the facility and/or its point of discharge; effective date(s) of the permit; limits; self-monitoring frequency and sampling type for each discharge point; etc. In addition, the permit also requires the permittee to prepare and submit monthly Discharge Monitoring Reports, which give a summary of the results of the self-monitoring. The Discharge Monitoring Reports are submitted to DEQ.

All Discharge Monitoring Reports from the permittee are reviewed with violations being noted. The permittee's compliance is then tracked using the PCS (an EPA computer database system). The DEQ screens the DMR for significant violations. This screening process allows the DEQ to concentrate its funding where it is needed most.

Quality Assurance/Quality Control practices are used by the DEQ to ensure that publicly owned treatment works are complying with permit conditions. Regular inspections of publicly owned treatment works facilities are conducted by the DEQ and/or the EPA inspectors with samples of a facility discharge collected for analysis. The DEQ requires that all operators and laboratory technicians of publicly owned treatment works be properly trained and certified.

### **Nonpoint Source Control Program**

The OCC serves as the lead technical agency for the nonpoint source (NPS) control program except for oil and gas activities and petroleum storage tanks, which are under Corp. Comm. jurisdiction. The NPS program is a cooperative effort of state, federal and local agencies. Some of these agencies include the OCC, the DEQ, the ODAFF, the OWRB, Corp. Comm., local conservation districts, and local landowners. The management programs identify the state, federal and local agencies with responsibilities relative to the nonpoint source of pollution in question and outline a plan of action to reduce or eliminate those sources.

The 2000 revision of the NPS Management Program document includes an inventory of best management practices available for controlling NPS pollution. There are two basic classes of Best Management Practices (BMPs): 1) practices that reduce the pollutants available for transport by the normal rainfall/runoff process (management practices), and 2) devices that reduce the amount of pollutants in the runoff before it is discharged to a surface water body (structural practices). The two main categories of BMPs can be broken down into the following seven general categories:

1. Detention Basins -- The term detention applies when the runoff is temporarily stored, and apart from relatively minor incidental losses due to evaporation or percolation, is subsequently discharged to surface water. Control results from a reduction in pollutant concentrations due to settling during the period that the runoff is detained.
2. Retention Devices -- The term retention applies when runoff is permanently captured so that it is never discharged directly to surface water. The usual mechanism by which storm-water controls permanently capture surface runoff is by infiltration. These techniques are often referred to as infiltration BMPs.
3. Vegetative Controls -- Vegetative controls provide contact between storm-water runoff and vegetated areas and accomplish pollutant removal by combination of filtration, sedimentation and biological uptake that reduce pollutant concentrations, and/or by a reduction in runoff volume due to infiltration or evapotranspiration. Vegetative controls are particularly effective in reducing erosion from runoff across disturbed sites or road bar ditches.
4. Source Controls -- Source control techniques include any practice that either 1) reduce the amount of accumulated pollutants on the land surface available for runoff by rainfall, or 2) regulate the amount of impervious area to reduce the portion of rainfall that will appear as runoff, or 3) exclude inappropriate discharges to storm drains.
5. Discharge Management -- This BMP category refers specifically to the hydrostructure/tailwater category. Under this BMP, impoundment discharge is managed so that the power of discharge water is kept to a minimum and the quality of water is kept at a maximum. This includes aeration of tailwater or, other measures that increase dissolved oxygen levels in tailwater areas.
6. Grade Stabilization -- Grade stabilization refers to any of several different practices used to stabilize areas where rapid runoff of storm-water results in erosion. These can be either temporary or permanent and are generally used in drainage ways where the slope exceeds five percent.
7. Stream Bank Protection -- Stream bank protection refers to the practices used to maintain banks by preventing bank scouring, caving, and gullyng. This category includes stream channel stabilization and in-stream structure for water quality control.

The OCC will perform pre- and post-implementation monitoring to gauge the success of its projects.

The OCC is working toward solving the nonpoint source pollution problems in the watersheds of Lake Eucha, Illinois River, and Wister Lake, in cooperation with several agencies, including Corporation Commission, the ODAFF, the Scenic Rivers Commission, DEQ, the OWRB, INCOG, ACOG, the Cooperative Extension Service, the NRCS, and the